Soil Conservation

December 1979

U.S. Department of Agriculture

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MIP on Broadway 16

From the Administrator

The Action Eighties

A recent adult-education catalog listed, among its "leisure" courses, "Issues for the Eighties."

The 1980's are here!

The issues must be dealt with—and not very leisurely.

The Soil Conservation Service and conservation districts want to make this next decade the *Action Eighties.*

As several major conferences on the future have suggested, what we do in the 1980's will determine what kind of society America will have in the years extending to 2030—and beyond. Recommendations and actions under the Soil and Water Resources Conservation Act will contribute to this future.

Conservation and management of *all* natural resources are essential to our survival as a Nation. All of us in the soil and water conservation movement share a tremendous public responsibility. To assure a permanent agriculture, and to meet America's many other needs, we must keep our natural resources at a high level of productivity, while keeping our environment healthy and beneficial.

In the 1980's, bold action programs will be needed for:

- Conserving soil and protecting water quality;
- Conserving water and making better use of it;
- Conserving energy and improving its use;
- Strengthening pasture, range, and forest resources;
- Retaining and improving farmland, especially the prime and unique lands and others that local and State groups consider important;
- Building a stronger, more self-sufficient rural America;
- Protecting wetlands and managing flood plains;
- Developing aquaculture for better nutrition and alternative sources of farm income;
- Enhancing fish and wildlife habitat;
- Protecting and enhancing the visual resource;
- Improving assistance to—and opportunity for—minorities, women, and disadvantaged citizens; and
- Helping local and State governments develop and strengthen their conservation programs.

These individual efforts will need to be coordinated toward the overall goal of an improved environment.

Such an all-encompassing mission is formidable. Yet the record of past accomplishment is clear. We can be even more effective in the 1980's. And we must.

Let us begin.

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Soil Conservation

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Managing reindeer in Alaska is a huge task. Data from the Landsat satellite is helping Eskimos manage their herds. See article beginning on page 4.

Reindeer Range and the Satellite

by Burton L. Clifford

Five hundred and sixty-five miles above Alaska's Seward Peninsula, modern technology is updating one of humanity's oldest agricultural enterprises—raising reindeer. The Landsat satellite is producing images of the tundra ranges used by reindeer herds.

Alaska is often pictured as a wildlife paradise, and in some areas animals abound. But other areas—some as large as many States—have little or no game. Reindeer are a domestic substitute for wildlife caribou. From reindeer, Eskimos obtain meat and hides they need for food and clothing. They also manage the herds as a source of income, selling some of the tanned hides to tourists and the antlers to buyers in Asian countries who market them as an aphrodisiac.

Reindeer are similar to Alaska caribou, but they are not native to the State. The first reindeer were imported from Siberia in 1891 to provide sustenance for Eskimos after a natural decline in the caribou population. Several Siberian herders and, later, Laplanders from Norway came to Alaska to help manage the herds.

By 1932, the herds had grown to over 640,000, but most of the animals were owned by nonnatives. In 1937, Congress passed the Alaska Reindeer Act, under which the Federal Government bought all reindeer, grazing rights, and handling and processing equipment owned by nonnatives. These were then distributed among the Eskimos and held in trust for them. Over the years, because of predation, disease, and inexperienced management, however, the herds dwindled to fewer than 30,000 animals.

In 1971, the Alaska Claims Settlement Act transferred more than 40 million acres to native ownership. The natives formed regional and village corporations to manage the land and investigate potential uses of their domain.

The NANA Development Corporation, a subsidiary of the Northwest Alaska Native Association, decided to enlarge the reindeer herds within their region on the Seward and Baldwin Peninsulas and develop a market for the meat as an additional source of income. Managing the herd—and the range—is an enormous task, however.

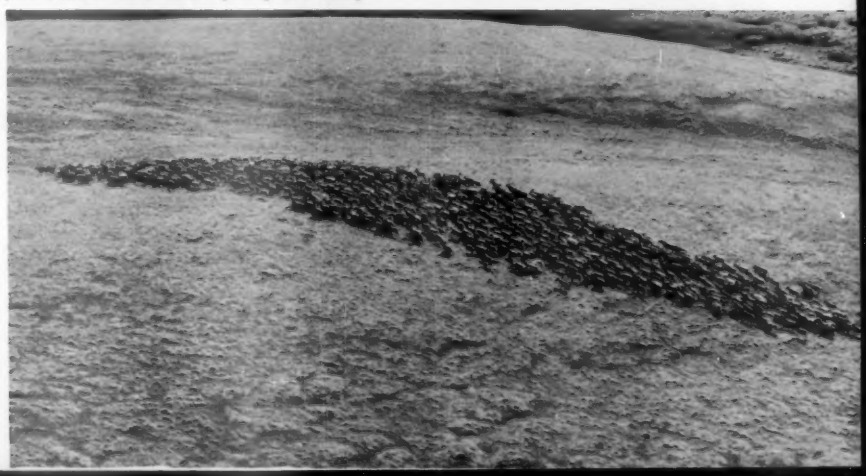
During Alaska's brief summer, food is plentiful on the tundra. Reindeer graze on grasses, sedges, berries, and willow. But during the long winter season, reindeer must paw through the snow to reach lichens, the only available food. Since lichens grow at a tedious rate of only one-fourth inch a year, the herds must move constantly over a huge range to survive.

NANA asked the Alaska Soil Conservation District and the Soil Conservation Service for assistance and, for the first time, technology made it possible to develop adequate management plans for the tundra range.

Developing a plan for reindeer range in Alaska requires the same information as a plan for cattle range in the "Lower 48." Conservationists first inventory the

Reindeer are herded through a chute to a dehorning pen during spring roundup. Each reindeer will yield 3 to 4 pounds of antlers, providing one source of income for Alaska natives.

In developing management plans for the millions of acres of reindeer range, traditional "on-foot" resource inventories were impossible. The Landsat satellite, however, supplied needed information quickly and easily.



resources. They identify the plant communities and correlate them with soil types to define range sites. They then map the extent and location of each range site.

Range conservationists determine the amount of annual forage production for each range site. They compute the amount of forage necessary for ecological interests, such as protection of the resource base and dependent fish and wildlife, and the amount of forage available for sustained grazing. Based on this information, they compute optimum stocking rates and determine management practices for the herd and the range.

A traditional resource inventory on foot was out of the question—NANA's range covers 4 million acres. The Landsat satellite, however, supplied the information quickly and easily.

As the satellite passes over, photoelectric detectors on board record reflected light from ground details in a path 115 miles wide directly below the satellite. The image is beamed to a ground tracking station, where it is recorded on magnetic tapes. The information is reassembled from the tapes and recorded on film by an electronbeam recorder. The information is gathered in four bands, and the resulting images can be combined with color filters to make color photograph-like images. These can be used at various scales for photo interpretation—delineating soils and range sites.

To verify the satellite data, a soil scientist, a range conservationist, and a Landsat imagery specialist flew into the roadless region by helicopter, setting down every 5 to 10 miles to check "ground truth." They completed the fieldwork in only 1 month at a cost of about 3 cents per acre.

Since the range surveys have been completed, SCS and the U.S. Department of the Interior's Bureau of Land Management developed management plans with the four range permit holders—totaling 4 million acres—in 1978 and surveyed another 4 million acres for plans in 1979.

Followup checks are essential for the management plans to work. Forage utilization surveys are made every year to check the regrowth of the lichens and to determine if the range is improving, deteriorating, or holding its own. This information is the basis for how soon reindeer can be returned to a given pasture, usually after 5 to 7 years' rest.

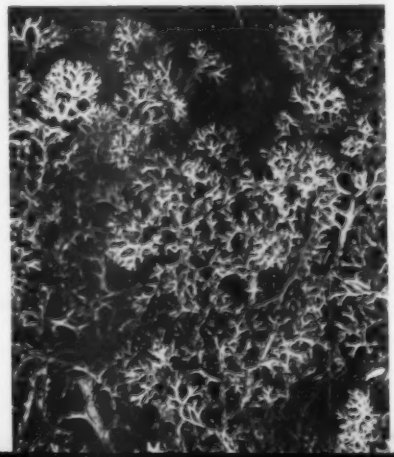
Forage utilization checks also are the basis for determining future stocking rates. The data coming in now indicate that the number of reindeer can be increased many fold. Through good planning and followup, Alaska can again develop a large red meat industry on its tundra ranges.

Mr. Clifford is State resource conservationist, SCS, Anchorage, Alaska.

Photos courtesy of the National Park Service and the University of Alaska.

During Alaska's short summer, food is plentiful on the tundra. But during the long winter season, reindeer must paw through the snow to reach lichens.

Lichens, or caribou moss, grow only one-fourth inch a year. For adequate protection, 5 to 7 years of deferred grazing are required.



Lake Michigan's Slips Are Showing

by Cheryl L. Rouse

The pounding waves push then pull against Lake Michigan's shoreline as they roll in and out. The water fairly shouts for attention and it is easy to blame for the gradual loss of banks along the shore. And yet some of the erosion results from the quiet insistence of surface runoff and underground seepage.

More and more people are finding the lakeshore a desirable place to build as did two Kewaunee County, Wis., professors. Their gray Cape Cod frame house sits atop the bluffs and flauntingly takes advantage of the view. At least it did for awhile. But rain fell on the house and garage roofs and ran down the asphalt driveway and over the edge of a bluff onto the bank. It wasn't long before the road was undermined and the vacation home in danger.

Each year the shoreline sneaks up on property owners along the lake. According to Soil Conservation Service District Conservationist Dave Gruber, "Sooner or later the erosion is going to get them."

Although urban buildup today compounds the runoff problem, glaciers skimming and re-laying soils for a million years, ending some 11,000 years ago, created the seepage problem. In the lakeshore area, a surface clay layer sits over a coarser, sandy layer referred to as a "sand lens." Below the sand lens is another clay layer. Ground water is trapped between the two less pervious layers and moves easily through the middle one. It comes out at the bank like a dripping faucet.

"This seepage keeps the soils continually wet so vegetation does not have a chance to get started," said Gruber. The water seeps out onto the soil weighting it so that it slips down the bank. Eventually, the clay ledge is undermined and follows along behind.

The other part of the problem is the surface runoff that flows over the bank and tumbles its way to the bottom. "It does not take much of a watershed to cause a serious problem," Gruber commented. "Concentrated runoff water from just a few acres can rip the bank open 18 feet deep."

The first lakeshore stabilization was done by Don Bothe who at that time was chairperson of the Kewaunee County Soil and Water Conservation District. With the help of SCS Conservation Technician Clarence Mittelstaedt, he put in a gully control structure and a grassed waterway with tile, which fixed that runoff problem. Then in the late 1960's, he placed deep tile to intercept the seeps. Bothe and Mittelstaedt have encouraged other property owners to do the same.

Gruber says that it takes an intensive investigation to find out where the seepages are coming from. The sand layers can vary from a few inches to 12 or more feet deep. To stop the dripping, tile must be placed at the top of the lower clay layer and parallel to the bank. According to Gruber, the maximum depth that tile has been placed is 12 feet. The tiling machine wheel will dig to 6 feet, but 4 to 6 feet more soil has been taken out with a bulldozer to get a little lower. The tile intercepts the water flowing toward the bank and carries it to the bottom of the bank.

To combat the problem of erosion from surface runoff, tile outlet terraces or diversions can be installed. The terrace, an earthen embankment along the bank's edge, keeps runoff from going over the bank. The water is directed to a low area in the terrace where an inlet tile carries it safely to the bottom of the bank.

Virgil Stangel, a property owner with more than 1,000 feet of farmland fronting Lake Michigan, has installed deep tile, terraces, and a gully control structure. Stangel remembers the places

At left, as more and more vacation homes are built along the shores of Lake Michigan, runoff from roofs increases. At right, erosion is accelerated when the runoff is funneled along a private drive over the edge of a bluff onto the bank.

where gullies started growing when he was a boy. They soon became deep and ugly. But today the gullies are gone thanks to an erosion control dam. The runoff was diverted to the dam which held it temporarily then safely lowered it to the bottom of the bank through a riser pipe.

The gully control structures, the deep tile, and the tile outlet terraces keep as much water as possible off the banks. When Stangel's banks dried out, he started planting crownvetch and birdsfoot trefoil which finished off the stabilization project. He added trees and shrubs which provide food and cover for wildlife for a final touch. Eight years later the bank is green and growing—with no slips showing.

Ms. Rouse was public information officer, SCS, Madison, Wis.

A tile outlet carries surface runoff from a surface inlet safely to the bottom of the bank, controlling erosion.

Water Harvesting by Wax

by Kirk G. Heaton

Wax apron catchments provide a new method of harvesting water for rangelands in the West. They can help many ranchers extend livestock distribution to areas without permanent water facilities.

Ranchers have used catchments to collect rainwater for many years. Generally, the cost of installation and maintenance for these systems has been high. But the new method—using paraffin wax to treat the ground surface—is one-third to one-tenth the cost of more common coatings such as asphalt, butyl rubber, and metal.

This method of harvesting water is currently in operation on the Arizona Strip, the dry, northwest corner of the State above the Grand Canyon. Dale Gubler and LeGrande Frei, owners of the G and F Ranch Corporation, installed a 3/4-acre wax apron on their land. They also used the hot-wax process to seal some natural sandstone catchments in other areas of the ranch.

Gubler and Frei have noticed a significant increase in water yield. "We are sold on the wax-treated catchments for our ranch and are ready to install them in other pastures," said Frei.

The 3/4-acre apron collects about 300,000 gallons of water during an average year, in an area where annual precipitation is 16 inches. This is more water than the ranchers can store, but it provides insurance for drier years.

A wax apron works best on sandy soils, such as those found on the Arizona Strip. Clay or finely textured soils cause maintenance problems and require a heavier application of wax because of the shrink-swell potential.

The apron was constructed by applying 2 pounds of wax per square yard to the soil surface. The paraffin wax, purchased in block form, cost 25 cents per pound. It was applied with special equipment provided by the USDI's Bureau of Land Management (BLM) through a work-trade agreement. This equipment included a boot tank in which the wax is melted and a hose and spray nozzle through which the wax is applied.

In addition to the wax, the owners had to rent a bulldozer to remove vegetation and rocks and to smooth the area. They used their own heavy truck to compact the soil. They also had to pay for labor to apply the wax, and labor and materials to build a fence around the apron. The total cost of the apron was $3,000.

The apron is connected to an 80,000-gallon steel storage tank with a 12-inch corrugated metal pipe. The tank, which cost $8,000, is 36 feet in diameter, constructed from 12-gage, multiplate steel, and has a concrete bottom. The 10-foot-high tank is buried 7 feet to reduce evaporation, allow gravity feed from the apron, and permit easy filling from a water truck should supplemental water be required.

The storage tank distributes water through pipelines to troughs in areas adjacent to the catchment facility. Plans are underway to cover the tank with a butyl rubber, floating cover to reduce evaporation. The cover will cost about $375. A 4-foot-high net wire fence was later installed on the edge of the tank to prevent animals from jumping into it.

Several agencies contributed to the installation of Gubler's and Frei's wax water-harvesting catchment. USDA's Agricultural Stabilization and Conservation Service provided cost sharing for installing the storage tank. USDA's Science and Education Administration's

At left, Shan Gubler sprays paraffin wax on bare ground for the catchment apron. At right, 6 months later, Shan's father, Dale, pours water on the apron as a test while LeGrande Frei looks on.

Water Conservation Laboratory in Phoenix, Ariz., and BLM have performed research and testing to develop the wax method.

The Soil Conservation Service issued interim standards and specifications for water-harvesting catchments, and provided technical assistance at each step of construction. SCS advises landowners on such aspects as soil sterilants, type of soil, catchment design, and potential problems with the site.

The wax water-harvesting catchment yields approximately 80 percent of total precipitation. The life expectancy is unknown, but some have been in use for over 5 years and have shown little deterioration when properly installed on suitable soil.

The wax-treated catchment is an important development with great potential. It opens up or "creates" new forage land and enables many States to increase their livestock production.

Mr. Heaton is district conservationist, SCS, Fredonia, Ariz.

Water Harvesting

Water harvesting is an agricultural practice which seals watersheds and increases runoff by making soil surfaces water repellent. One purpose for this practice is to provide water for livestock or wildlife in semiarid environments.

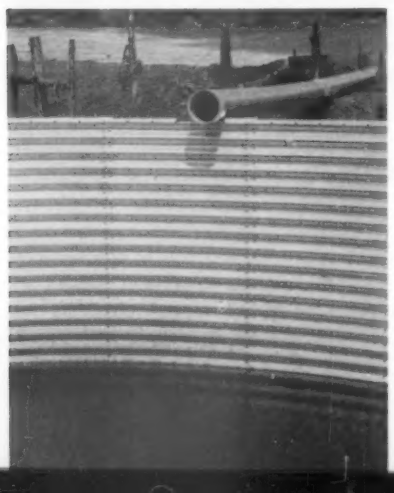
The water-harvesting catchment is the facility for collecting and storing precipitation and must be designed to suit the water requirements and the site conditions. The basic components of the catchment are an apron to collect the water, a conveyance system, and a storage basin.

Many points are considered in designing a water-harvesting catchment. Design criteria include quality and quantity of water required; probability of filling the storage basin; adequate size, impermeability, and durability of storage basin; and the area of apron needed for the required water yield.

The apron must be smooth and impervious. Materials used to construct it range from earth, treated earth, wax, rubber, plastic, low-grade oils, asphalt, concrete, and steel. The apron should be protected from damage by excess runoff by installing either an overflow pipe or emergency spillway.

Provisions should be made to protect the catchment, including: diverting foreign runoff and preventing excessive sedimentation; a sediment trap between the apron and storage basin; evaporation repressants in the storage basin; and fencing or some other method to prevent damage from weather, animals, vandals, wildlife, and traffic.

To further insure the efficiency of chemically treated catchments, the soil stabilizer, cellulose xanthate, may be applied. Cellulose xanthate is inexpensive because it is made from waste paper. It is treated chemically to be water soluble, and then sprayed on the apron. It penetrates the soil and, in the drying process, binds the soil particles together. The soil stabilizer prevents erosion and cuts down on the amount of wax or other precious petrochemicals used in water harvesting.



Even before the wax apron was completed, rain had partially filled the 10-foot-deep storage tank. After the apron was completed, a 4-foot-high fence was installed to prevent animals from jumping into the tank.

Gentle Hands Harvest Rare Seeds

by Steve Foland

The vast Texas range surrounding Abilene at one time supported a variety of perennial woody plants that provided excellent food for domestic animals and food and cover for wildlife. After being exposed to more than a century of intensive grazing by domestic livestock, many of these palatable forbs and shrubs have become so rare as to be true novelties among the mesquite and prickly pear.

Adequate quantities of seeds for the once abundant plants have been unavailable because of the difficulty in mechanically harvesting the very small seeds. Over the years, range and plant materials specialists have had to concentrate on the more easily harvested seeds from domestic grasses for their seeding mixtures.

In the spring of 1976, the staff of the Abilene State School decided that harvesting the woody plant seeds would provide excellent horticultural training and therapy for the mentally handicapped residents of the school. School officials contacted the Middle Clear Fork Soil and Water Conservation District and, in May, signed a cooperative agreement with the district and the Soil Conservation Service.

The three-way agreement provided for the SCS plant materials center in Knox City, Tex., to supply the school with forbs and shrubs. The school would provide the land for growing the plants and the labor for cultivating the plants and harvesting the seeds. The best seeds would be sent to the plant materials center for inclusion in range seeding mixtures. The mixtures are used in field plantings throughout Texas for livestock and wildlife consumption.

A resident of the Abilene State School in Texas carefully harvests the seeds from a skeletonleaf goldeneye plant.

Walter Driesner, on the State school staff, adopted the project as an "on-the-job hobby" and began keeping meticulous records of the plantings and harvests. In 1978, Driesner's records showed that the students harvested 50 pounds of the rare littleleaf leadtree seeds.

SCS District Conservationist Kenneth Cash, who provided technical assistance for the project, emphasized the dedication required for handpicking the tiny seeds. "It can take three people as long as 20 minutes to harvest the tiny seeds from a single branch of a shrub," said Cash. "The participants in this project have the patience for the job; they like to think of themselves as plant rescuers."

Thus far the students have "rescued" such native plants as skeletonleaf goldeneye, Texas peachbrush, smallflower peachbrush, Wrights pavonia, littleleaf leadtree, and Wrights anisacanth. Their dedication is paying off.

Mr. Foland is chief, conservation news and reports branch, SCS, Washington, D.C.

Wastewater Gets the Treatment

by Bill Saalman

St. Petersburg, a progressive city of 240,000 on Florida's suncoast, is undertaking a unique water conservation program in its quest for a reliable public water supply. The new program could save as much as 40 percent of the city's daily consumption of potable water.

All of the city's drinking water, which amounts to 40 million gallons per day, is imported from wells located up to 60 miles away. In dry weather, as much as 30 percent of the daily drinking water supply was being used for irrigating lawns. It had been projected that at this usage rate, St. Petersburg would have adequate drinking water supplies only through the year 2020.

To help stretch its potable water supply, St. Petersburg adopted a program to recycle treated wastewater for spray irrigating the city's green spaces. The plan included building four secondary sewage treatment plants and an 82-mile distribution system to deliver the recycled wastewater. So far, two of the treatment plants and about 25 miles of the distribution system are completed. The entire project, which is to be completed by 1983, will be able to treat 66 million gallons of wastewater per day and will provide enough water to irrigate 2,500 acres.

At the plants, the wastewater goes through grit removal, aeration, clarification, multimedia filtration, flash chlorination, and a retention basin that has facilities for additional chlorination when needed. In periods when the demand for irrigation water is low, it will be pumped into deep saltwater wells for storage and reuse. This will insure that no discharge reaches surface waters.

The recycled water has no odor, and viruses are at a nondetectable level. The nitrogen and phosphorus content of the wastewater is retained, reducing the need for fertilizer in areas irrigated with the effluent.

To insure that a mixture of potable water and recycled water cannot occur under any conditions, the recycled water is distributed through an entirely separate system identified by its brown hydrants. All fittings, threads, and other parts are different from those for the city's potable water system.

Sludge produced by the secondary wastewater treatment plants is being hauled by tank trucks and applied to public and private lands. Much of the sludge is trucked to a holding lagoon and pumped through high volume irrigation guns to a large area of land used for testing different grasses as receptors of sludge. Most of the area is in bermudagrass. But stargrass, for example, seems to have a good potential for heavy growth and nutrient uptake. An open drain that surrounds the site catches surface runoff. Excess water is pumped to a wooded area to prevent discharge into Tampa Bay.

Since the city's inception of the wastewater recycling system in 1971, the Soil Conservation Service has provided technical assistance on the project through the Pinellas County Soil and Water Conservation District. In 1978, SCS entered into a mutually beneficial Interagency Personnel Agreement (IPA) with St. Petersburg. Through this kind of agreement, an SCS employee is temporarily assigned to work closely with another agency on a special conservation project, providing technical assistance and other help.

SCS has helped the city choose plant materials and determine their moisture needs and helped with soil interpretations, irrigation management, sanitary engineering, and public information programs. Through the project, SCS is gaining insight into the nutrient benefits of treated wastewater for soil and plant life, sludge management, and the economics of water reuse and is gaining an awareness of virus control. Funding for St. Petersburg's wastewater recycling system has been a joint effort between the city and the U.S. Environmental Protection Agency.

Now, parks, schoolgrounds, golf courses, median strips, lawns of private residences, and commercial and industrial sites in St. Petersburg are being irrigated with nutrient-rich treated wastewater. Recognizing the city's achievement, the National Society of Professional Engineers chose the water recycling project as one of its "Ten Outstanding Engineering Achievements of 1976."

In St. Petersburg, saltwater intrusion on the city's surficial aquifer and the scarcity of lakes and streams make treated wastewater the only dependable source of irrigation water. Also, using the recycled wastewater for irrigation postpones the day the city will need new potable water pumping and transmission facilities. This type of water conservation program could work in many of the country's water-short areas.

Mr. Saalman is a soil conservationist, SCS, St. Petersburg, Fla.

Three Hats Fit as Well as One

by Justus V. Baum, Jr.

Five years ago, this was a rundown, gully-ridden farm. Because of the influence of Charles Gardner, with technical help from SCS, the gullies have been healed and the farm restored to productive use.

There is a saying about wearing too many hats, but Charles Gardner of Lycoming County, Pa., does not think it is true. Gardner is a farmer, a Lycoming County Conservation District director, and a Franklin Township supervisor. In his opinion, he does better in any of the three jobs because of the other two.

"I can be a better supervisor because I understand farmers and their problems; I am a better director because I understand what is happening to the resources in my area; and I am a better farmer because of all I learn from other farmers that I contact," he explained.

Gardner first learned about conservation practices in the 1950's when a neighbor installed diversions. Whenever it rained, Gardner could be found on his neighbor's farm checking the diversions to see if they were doing their job. What he saw was runoff safely diverted around his neighbor's barnyard and cropland, erosion successfully controlled, and the township road protected.

He was convinced that diversions would work on his farm, part of which lay in a large basin scarred by gullies 2 to 3 feet deep. Before he installed the diversions on his farm in 1958, a 21-inch pipe could hardly handle the runoff at the lower end of the basin where the drainage crossed the township road. After he installed the diversions and contour strips, even runoff from major storms didn't fill a 15-inch pipe and no gullies were formed. This was a lesson that would help him as a township supervisor.

"It's called stormwater management today," Gardner commented; "but whatever it's called, it works."

Franklin Township, in eastern Lycoming County, is mostly hilly farm country with some large, scattered woodlots and one small village. With an average rainfall of 42 inches a year, the township has frequent problems with water runoff. When the rain comes, it comes fast causing a lot of headaches to the 48 miles of township roads.

"Another seasonal problem is frost and underground springs creating large soft areas in the township's roadbeds," Gardner said. "These become booby traps to cars and trucks and require a good Samaritan to come along and pull the unfortunate motorist out of the mud.

"These are the kinds of problems we faced when I first became a township supervisor back in 1951," said Gardner. "Shortly after that, I became acquainted with the people from USDA's Soil Conservation Service. From the experience I gained on my own farm, I was convinced that the same principles that I applied as a farmer in managing soil and water could be used in my work as a township supervisor.

"One of our goals was to rebuild the township roads to make them safer and to eliminate the wet areas," Gardner continued. "Whenever a township road section was rebuilt, a meeting was held with all the landowners along the way: First, to tell them of our plans and, second, to sell them on the idea of installing a complete surface water management system on their land. We urged them to become cooperators with the Lycoming County Conservation District so that they could receive the services of SCS in installing conservation practices. We also encouraged them to participate in the programs of USDA's Agricultural Stabilization and Conservation Service (ASCS) for cost-sharing assistance.

"The township improvement plans were prepared in conjunction with the farms' surface water management. Road culverts were placed to connect with the farmers' diversions or meet their diversion outlets. With this cooper-

SCS District Conservationist Justus Baum (left) and Gardner examine crownvetch seeding on a township roadbank. Gardner estimates that roadbank seeding saves the township $100 to $200 per mile each year in road maintenance costs.

ative approach, the township supervisors have never had a problem obtaining rights-of-way from landowners. The supervisors feel that this way they help both the farmer and the township."

Gardner is convinced that this really happens. He estimates that in 1972 during flooding caused by Hurricane Agnes and again in 1975 when the effects of Hurricane Eloise were felt, the township saved thousands of dollars in road damage simply from the diversions on the farmland which also protected the township roads. While patrolling the roads during the storms, Gardner observed that farms with conservation practices—stripcropping, diversions, and seeded pasture and hayland—had no significant increase in runoff during the storms.

The other township supervisors, Leroy Whitmoyer and Robert Ditzler, were amazed at the results. Today, they spend almost as much time as Gardner helping to achieve these improvements. The township supervisors point with pride to the fact that at least 20 of the soft spots in the roads have been eliminated with the surface water management in combination with underground drains and stone.

Because of his interest in conservation, Gardner was also appointed to the board of directors of the Lycoming County Conservation District. Gardner finds that he can carry out district activities at the same time as he is carrying out township responsibilities. For example, one spring Gardner sold 135,000 tree seedlings for the conservation district in less than 1 day while contacting landowners about township business.

In addition, the township supervisors strongly encourage farmers to develop springs for useful purposes, such as livestock water and in some cases domestic use. This practice also keeps the water from reaching the township right-of-way and becoming a road maintenance problem.

With his farm experience, Gardner could see that proper grading and seeding of township roadbanks would save money. In the 1960's, the township began a regrading and seeding program which Gardner estimates now saves the township $100 to $200 per mile each year on road maintenance where the seeding work has been completed.

Another project that the township supervisors point to with pride is the new municipal building area in Lairdsville. The building is located on a tract of land adjacent to the elementary school and the volunteer fire company. Through a cooperative project with both of these community groups and with the assistance of SCS, a complete surface and subsurface water management system was installed. As a result, a recreation area with a ballfield, playgrounds, and a site for the fire company's annual carnival now stands on previously unused land. The practices include extensive underground drainage, spring water drainage, stormwater diversions for surface water, waterway outlets, drop inlet structures, seeding, and a proposed underground gravity-fed water storage system for the volunteer fire company.

"We cannot help but feel some pride in how much we as township supervisors have been able to stretch the tax dollar to get as much done as we have," Gardner said.

"We feel, with technical assistance from SCS, the landowners' financial assistance from ASCS, and our ability to get the job done, we are making the township a better place in which to live," he added.

As he looks back on all of the achievements of the past 20 years, Gardner says proudly, "I really feel that I can wear more than one hat and help not only myself but also the people in my township and county."

Mr. Baum is district conservationist, SCS, Williamsport, Pa.

Making 208 Work

by Katherine C. Gugulis

Two years ago, the 5,000-acre Dragon Creek watershed in New Castle County, Del., was a soil conservationist's nightmare. The erosion rate was one of the highest in the county. Almost 45 percent of the land was corporate-owned and rented to farmers on a year-to-year basis. Conservation practices were nearly nonexistent.

Today, after a crash program by the New Castle Conservation District, the watershed is being touted as a conservation success story. The National Association of Conservation Districts has called it a model program—and with good reason.

About 92 percent of the watershed is now covered by conservation plans. All but one of the 23 landowners have become conservation district cooperators. Where 2 years ago conservation practices were nearly nonexistent, there are now 722 acres of conservation cropping systems; 427 acres of cover crops; 1,062 acres of crop residue management; 613 acres of chiseling and subsoiling; 1,437 acres of conservation tillage; and 555 feet of diversions. The erosion rate has been cut by more than half. And much more conservation work is underway.

How did all this happen?

Martin Gordon (left) and Richard Brush, former SCS district conservationist for New Castle County, inspect a gully on cropland rented out by industry. Farmers with short-term leases from industrial landowners had little incentive to invest in practices with long-term benefits.

While some agencies were looking for reasons not to get involved in the planning for nonpoint source pollution control, as mandated by Section 208 of the Federal Water Pollution Control Act Amendments, New Castle Conservation District leaped at the opportunity to use a new tool in getting conservation on the land.

How do conservation practices affect water quality? Studies show that after point sources of water pollution are controlled, 90 percent of all suspended solids in waterways will originate from nonpoint sources. Sediment is the single major source of nonpoint source pollution in the United States and most of it washes off unprotected cropland.

In 1977, New Castle became the first conservation district in the Nation to establish its own voluntary agricultural 208 water quality program.

With a $28,000 grant from the U.S. Environmental Protection Agency (EPA), the district hired a 208 staff headed by part-time coordinator Martin Gordon, a retired Soil Conservation Service district conservationist with plenty of experience in conservation planning. In addition it hired Clement Hathaway as a full-time planner who was later joined by Tom Jenkins, conservation technician.

The team's approach—a combination of low-key salesmanship and persistence—obviously paid off. What pointers do they have for others faced with similar situations?

First, the team members targeted their efforts to a specific geographic area. They concentrated on Dragon Creek watershed because of the high rate of erosion, its manageable size, and the complexity of owner/operator relationships. By directing their efforts to

a specific watershed, they were better able to set goals and measure progress. "We thought if we could succeed with Dragon Creek, our approach would work anywhere," said Gordon.

Their next big hurdle, one shared by most conservationists, was convincing the land owners and operators to invest in conservation measures. This proved particularly difficult in Dragon Creek since so much of the land was owned by corporations with little economic interest in conserving the soil. To them, the major value of the land was as a buffer between their plants and surrounding communities. Meanwhile the farmers who rented the land, because they had no long-term leases, were leary of investing in practices that had long-term benefits.

Although the 208 team wasn't able to rectify the short-term lease problem, they were able to get the landowners and the renters to discuss the situation with each other. "The corporations' land managers indicated that they were satisfied with their leasing arrangements and could foresee no reason to change in the near future," explained Gordon. "This gave some of their renters the assurance they needed to invest in conservation measures."

Acceptance, however, didn't come easy. That's where the persistence paid off. "After we first talked to officials at one of the corporations, a petroleum company, they thought they'd never see us again," said Gordon. "They were really surprised when we came back with soil information and conservation plans that we had developed with their renters. Eventually, after we explained what was needed and wanted, the corporation officials agreed to cooperate with the district.

"Even with the farmers, we had to go back often to gain their confidence," said Gordon. When explaining their program to farmers, the 208 staff avoided pressure and scare tactics. They emphasized the production benefits of conservation first. Later they mentioned its beneficial effects on water quality.

Also key to the success of their program was the formation of a 10-member farmer's advisory committee. One of the first duties of the committee was to decide which of the 10 best management practices would receive the highest priority and to devise a practical approach to the effort. This way, local people decided for themselves what was needed and feasible. Having some of the leading farmers and landowners on the committee also helped the 208 staff gain acceptance by others in the watershed.

The success of New Castle's 208 program is not measured in numbers alone. It helped generate a kind of community spirit about conservation. At a luncheon sponsored by the district in appreciation of the cooperation given to the team, 29 of the 33 invited cooperators attended.

EPA officials have also expressed their approval. They nearly doubled the original grant for the 208 staff to carry out its program in the larger Appoquinimink watershed.

Predicts Gordon, "With as much success as we've had in Dragon Creek, we'll have even more in Appoquinimink."

Ms. Gugulis is public information officer, SCS, College Park, Md.

Jack Wiley's Story

Jack Wiley, a farmer in the Dragon Creek watershed, tells his own 208 success story. Encouraged by the 208 staff, Wiley became the first farmer in the watershed to experiment with conservation tillage.

"I had thought a lot about no-till," said Wiley. "Then Martin Gordon and his crew came along and sold me on it." So he bought a no-till planter and learned how to use it.

At first, he was skeptical. "We put the corn in and I thought it would never come up it was such a cold, wet spring. A lot of my neighbors would come by and comment that it looked like a big mess."

Despite the slow start, Wiley's first 50 acres of no-till corn yielded 162 bushels an acre—a significant 17-percent increase over his conventionally planted corn. In 1979, he planted 250 acres of no-till corn.

According to soil conservationists, conservation tillage can reduce erosion by up to 80 percent, thereby decreasing significantly the amount of sediment entering streams.

Although Wiley recognizes the moisture conserving benefits of conservation tillage, he says his main concern was trying to prevent erosion and to save energy and labor. In the 1 year that the 208 team stepped up planning efforts, he also installed several waterways and a diversion terrace to control water and prevent erosion.

Now a firm believer in soil conservation, Wiley says, "Nowadays it's nice, following a big rain, to go out into a field where there was a wash and always had been a wash to see that what I planted is still there."

MIP on Broadway

Clean Water Models, Part 3

This is the third and final part of a series on the seven Model Implementation Projects (MIP's) going on throughout the United States (see the October and November 1979 issues for parts 1 and 2). The MIP's are a 3-year test to demonstrate how concentrated cost sharing and technical assistance by the U.S. Department of Agriculture and the U.S. Environmental Protection Agency can help solve agriculture-related water quality problems. The South Carolina and South Dakota MIP's are described here.

by Steve Foland

A wide swath of about 25,000 acres of mostly red clay in Anderson County, S.C., makes up the Broadway Lake watershed. The watershed, which has a long history of erosion and sediment problems, was chosen as a Model Implementation Project (MIP) area to demonstrate to landowners how conservation practices can keep soil from washing away and polluting the lake.

The 300-acre Broadway Lake is just outside Anderson in the northwestern part of the State. The manmade lake is one of Anderson County's oldest recreation sites. The lake was built as part of a Work Projects Administration (WPA) project in 1938 at a site where many small streams merged. About 80 acres, or more than one-fourth, of the lake is now completely silted in. Along with the sediment, agricultural chemicals and animal waste have been running off farmland and into the lake for many years.

For more than a century, clean-tilled cotton was the dominant crop in the county, but it has been replaced by soybeans, corn, and other crops. "Cotton was a pretty bad crop for soil erosion," said District Conservationist George Watkins of the Soil Conservation Service, "but its replacements are not much better. We still have mostly a one-crop system around here. It's beans, beans, beans . . . year after year. The rolling hills in the watershed require entire management systems, such as terracing, minimum tillage, and good crop rotations to control erosion."

The major conservation needs identified in the project proposal for the watershed included treatment of 170 acres of critically eroding land. Critical area treatment involves smoothing gullies and eroding roadbanks and planting them to grasses or trees, or both.

Watkins said there is also a need for approximately 25 debris basins in the watershed to catch and store sediment, 10 animal waste lagoons, and other agricultural waste management systems. The project calls for accelerated assistance to landowners in planning and applying terraces, grassed waterways, pasture planting, stripcropping, field borders, minimum tillage, and timber stand improvement.

SCS is providing technical assistance to landowners in planning, designing, and applying conservation practices. USDA's Agricultural Stabilization and Conservation Service is providing funds for cost sharing on the practices through the Agricultural Conservation Program. "The voluntary response to the project," said Watkins, "has been very good. It sure helps when we can offer as much as 90 percent cost

sharing. We especially hope to increase the acreage of minimum tillage, stripcropping, and crop rotations."

Edward Drake is one Broadway watershed landowner who is well along with his conservation work. Watkins and his staff helped Drake prepare a conservation plan for his land and he began right away to apply the plan's recommendations. As Drake put it, "I saw that I was losing too much of my soil and I was tired of driving my tractor across gullies." He has already sloped and seeded 2 acres of grassed waterways and constructed 25,000 feet of terraces and 1,100 feet of diversions. "These practices, along with my crop rotations that include some minimum tillage plantings, should bring my soil losses down to reasonable limits," said Drake.

For the Broadway Lake MIP, the U.S. Environmental Protection Agency (EPA) is providing funding for employing a project coordinator from the South Carolina Land Resources Conservation Commission. Through the Clean Lakes Program (Section 314 of Public Law 92-500) EPA is also providing funding for roadside erosion control.

USDA's Science and Education Administration-Extension, the Anderson Soil and Water Conservation District, the South Carolina Commission of Forestry, the South Carolina Highway Department, and the South Carolina Department of Health and Environmental Control are cooperating in the MIP effort.

With EPA funding, the South Carolina Department of Health and Environmental Control and Clemson University have set up monitoring equipment in four small streams leading into Broadway Lake. The monitoring stations will provide basic information concerning water quality and help measure the effects of conservation treatment on the land upstream.

George Watkins said conservation measures are being applied on much of the land in the MIP area that is drained by streams flowing into the lake. He added that keeping the soil where it belongs will help keep the lake's water clean and cut down on sediment and other pollutants carried by streams above the lake.

Mr. Foland is chief, conservation news and reports branch, SCS, Washington, D.C.

Because of erosion problems in the Broadway Lake watershed, streams carried heavy loads of sediment and other pollutants to the lake. Conservation practices applied through the MIP to control erosion will help restore water quality.

Saving a Lake Called Herman

by Joyce S. Watkins

"I want to help the lake," said Irene Tyrrell, a widow whose farm is in the Lake Herman watershed. Many other people in the southeastern South Dakota community of Madison say they feel the same way.

Lake Herman is a shallow, natural lake with an average depth of 8 feet. The lake has a surface area of 1,350 acres and a watershed area of 44,670 acres. About 75 percent of the watershed is in cropland and about 15 percent is used for pasture and range. The major crops are corn and small grains which support livestock operations.

About 70 families live along the shores of the lake, and the State 4-H camp and Lake Herman State Park lie along the rest of the shoreline. In 1976, more than 325,000 people visited the park for fishing and recreation. But, as water quality in the lake deteriorated, local residents watched the number of visitors dwindle to 173,000 last year.

The main water quality problem in the lake is sediment loading. Most of the sediment enters the lake by four major tributaries that flow into it. The main source of the sediment is agricultural activities around the tributaries. Also, the shallowness of the lake contributes significantly to the water quality problems because wind action continually stirs up the sediment.

Tim Bjork, MIP coordinator, records data from the automatic samplers installed along the tributaries to Lake Herman.

A task force was established to plan the rehabilitation of the lake when it was chosen as a site for a Model Implementation Project (MIP) in 1978. The Lake County Conservation District is sponsoring the MIP and many Federal, State, and local agencies are cooperating in the effort. The South Dakota Department of Water and Natural Resources appointed an MIP coordinator, Tim Bjork. Bjork works out of the conservation district office and his position is funded by the U.S. Environmental Protection Agency (EPA).

It was determined that applying and maintaining conservation practices in the drainage area, including the construction of several sediment control dams, was the most effective method for treating sediment and nutrient loading in Lake Herman. USDA's Soil Conservation Service is providing technical assistance to landowners in the watershed in applying conservation practices, and EPA is providing some funding through the Clean Lakes Program (Section 314 of Public Law 92-500). USDA's Agricultural Stabilization and Conservation Service (ASCS) made Agricultural Conservation Program (ACP) funds available to landowners in the watershed. As much as 90-percent cost sharing is available on some practices.

Word of the cost sharing spread quickly—through public meetings, special mailings, and local print and broadcast media. SCS District Conservationist Oakley Hoy, SCS Soil Conservation Technician Ron Adamson, and MIP Coordinator Tim Bjork teamed up to help watershed farmers put more conservation on the land to help save Lake Herman. The landowners were very cooperative. Through past efforts of SCS and through the MIP, by 1978 about 75 percent of the drainage area into the lake was adequately treated. Practices applied included terraces, contour farming, conservation tillage, grassed waterways, and conservation cropping systems.

Chairperson of the Lake County Conservation District, Vern Spartz, said, "I can see a difference in the lake already, since the conservation work was begun. Maintenance of the practices, coupled with the sediment retention dams, should extend the life of the lake by many years."

So far, five small dams have been built. One is on land farmed by two brothers, Orris and Alden Jung, who live along the lake. The dam holds sediment and other pollutants back and also stores water for livestock.

Another dam is on Albert Vanhove's farm. Even though the stockwater dam SCS designed for him will cost about $1,000 above the cost sharing he will receive, Vanhove is proceeding with the plan. His dam will hold back about 18 feet of water. The semiretired farmer, an avid hunter and fisherman, will gain more than stockwater and pollution reduction from his dam: He will also gain a pond he can stock with bass.

Irene Tyrrell's farm is about 3 miles from the lake. She had a wildlife pond installed and maintenance work done on her terraces to insure that no sediment or other pollutants from her land reach the lake.

As conservation practices are applied in the watershed, an extensive program is underway to monitor lake water quality. In 1978, monitoring was limited to some tributary and inlake sites. But now, the monitoring program covers the four main tributaries and their drainage areas as well as inlake sites.

Samples of the lake water are taken at three sites from a pontoon boat leased from Dakota State College. At each site, samples are taken of surface, middepth, and bottom lake water. The monitoring will help determine how effective the conservation practices are in reducing erosion. The Remote Sensing Institute and USDA's Science and Education Administration-Agricultural Research are also helping to monitor water quality in the lake and to determine the sources of sediment still needing treatment.

Under a contract between the Dakota State College and the conservation district, Liza Knox, a student at the college, is helping MIP Coordinator Bjork with some of the inlake sampling and biological analysis. The State Health Laboratory is conducting chemical analysis of the lake water.

In September 1979, construction began on two sediment retention dams designed by SCS. A third one is scheduled to be built in 1980. At the dams, researchers will test the effects various detention periods have on nutrient deposition.

Looking to the future of Lake Herman, Bjork said, "We hope dependable fishing can be brought back to the lake, as well as the other recreational benefits. We hope that the eutrophication process can be slowed down. The people in the community enjoy the lake and we are all working together to save it."

Ms. Watkins is public information specialist, SCS, Huron, S. Dak.

District Says Thanks

Vern Spartz, chairperson of the Lake County Conservation District, said, "This community is pleased with the action taken under the MIP. Many studies have been done on the lake in previous years, and it is refreshing to see efforts combined and action being taken. There have been a lot of personal services and monetary contributions to this project. It is the local interest and support that has made the Lake Herman MIP a success."

As the project sponsor, the conservation district says thanks to:

Dakota State College;
Lake County Commissioners;
Lake Herman Development Association;
Madison City Commissioners;
Cooperative Extension Service;
First Planning and Development District;
East Dakota Conservancy Sub-District;
Old West Regional Commission;
Remote Sensing Institute;
South Dakota Department of Agriculture, Division of Conservation;
South Dakota Department of Game, Fish, and Parks;
South Dakota Department of Water and Natural Resources;
State Conservation Commission;
U.S. Environmental Protection Agency;
USDA's Agricultural Stabilization and Conservation Service, Economics, Statistics, and Cooperatives Service, Farmers Home Administration, Science and Education Administration, and Soil Conservation Service; and other support groups.

News Briefs

Final Rules Announced for Flood Plain Management and Protection of Wetlands

New steps by USDA's Soil Conservation Service to protect valuable wetlands and avoid encroachment on flood plains were announced by Assistant Secretary of Agriculture for Natural Resources and Environment M. Rupert Cutler.

Two separate rules direct SCS personnel to use the agency's technical assistance programs to encourage sound wetland and flood plain management decisions by land users.

Cutler said the rules will strengthen SCS's commitment to the protection of wetlands and wise management of flood plains.

All department agencies that administer grants, loans, regulations, or technical assistance programs have been ordered to review their actions and change them where needed, Cutler said, to prevent excessive loss of agricultural land or wetland and to avoid further encroachment onto flood plains.

The agencies also have a positive obligation, Cutler said, to provide landholders and other concerned people information about the alternatives to—and the environmental, social, and economic implications of—proposed actions.

SCS provides technical assistance to land users primarily on non-Federal land through local conservation districts and other State and local agencies. As an example of how the assistance will change, Cutler said in the future SCS will insure that its technical assistance will not lead to the unnecessary conversion of the land to nonagricultural uses.

SCS prepared the flood plain management rules in consultation with the Water Resources Council, the U.S. Department of Housing and Urban Development's Federal Insurance Administration, and the Council on Environmental Quality. It prepared the final rules on protection of wetlands with the aid of written comments from numerous other Federal, State, and private agencies.

Less Developed Countries to Receive Technical Soil Assistance

The U.S. Department of Agriculture will provide permanent personnel to help less developed nations conduct soil surveys in their countries, according to Norman A. Berg, administrator of the Department's Soil Conservation Service.

Under an agreement with the State Department's Agency for International Development, SCS will assign agricultural experts for short terms to help identify and categorize soils in tropical and subtropical countries according to an international system of classification. The technical assistance will help the countries conserve and better manage their soil, water, and related resources.

The agreement represents the first time that USDA has assigned permanent staff to assist with soil studies in foreign countries. Previously, the Department provided assistance on a country-by-country basis as needed. The new approach will not only improve soil management in countries outside the United States, but will also help with the transfer of technology from one country to another, Berg said.

Six New RC&D Areas Approved for USDA Assistance

Six new Resource Conservation and Development (RC&D) areas, covering more than 22 million acres in 40 counties and Puerto Rico, are now eligible for RC&D assistance from the U.S. Department of Agriculture, according to Secretary of Agriculture Bob Bergland.

The areas are located in Alabama, Georgia, Idaho, Iowa, West Virginia, and Puerto Rico.

Objectives of the locally sponsored RC&D areas are to improve the use of each area's natural resources; improve and expand economic, cultural, and recreational opportunities for local residents; and enhance the environment.

RC&D area sponsors include county governments, conservation districts, and municipal governments. Many other interested organizations endorse and support these efforts, and USDA provides technical and financial assistance to carry out the resource conservation and development activities in these locally administered areas.

Addition of the six areas will make a total of 184 areas now authorized for assistance. The Soil Conservation Service has USDA leadership for the RC&D Program.

The areas include:

- CAWACO area, Alabama: Blount, Chilton, Jefferson, Shelby, and Walker Counties;

- Oconee River area, Georgia: Barrow, Clarke, Elbert, Greene, Jackson, Madison, Morgan, Oconee, Oglethorpe, and Walton Counties;

Book Reviews

- East Central Idaho area, Idaho: Butte, Clark, Custer, Fremont, Jefferson, Lemhi, Madison, Teton, and part of Bonneville Counties;

- Pathfinders area, Iowa: Davis, Jefferson, Keokuk, Mahaska, Wapello, and Van Buren Counties;

- Great Kanawha area, West Virginia: Boone, Cabell, Clay, Kanawha, Lincoln, Logan, Mason, Mingo, Putnam, and Wayne Counties;

- El Caribe area, Puerto Rico: the southwestern part of Puerto Rico, including the cities of Ponce and Mayaguez, and the soil conservation districts of Caribe, Oeste, Sudeste, Sur, and Suroeste.

Properties and Management of Forest Soils.

William L. Pritchett, 1979. John Wiley & Sons, New York. 500 pp., illus., $21.

This book provides a good overview of current thinking and activities related to soils under forests. It is intended for advanced students in forest soil science and foresters, and is useful in the United States and many other parts of the world.

Part I presents information on properties and dynamic processes in soils under forests. Its 13 chapters describe: (1) development of soils and forests, (2) types of soils associated with major forest biomes worldwide, (3) composition and biology of the forest floor, (4) chemical and physical properties, and (5) hydrology and the integrated effect of properties on site productivity.

Part II delves into management and its consequences. These last 10 chapters mention various systems to classify forest lands and describe silviculture and nursery management. The book gives special attention to the effects of intensive management on long-term productivity as well as on soils under short-rotation plantations. Also covered are special needs with problem soils; chemical treatments for fertilization, pests, and disease; and the effects of fires.

Pritchett's chapters are specific and well organized, and the index provides an excellent cross-reference.

—Richard W. Arnold, soil scientist, SCS, Washington, D.C.

Soil Survey Contracts and Quality Control.

S. Western, 1978. Oxford University Press, Oxford, England. 284 pp., illus. (b&w), $32.50.

This book is a valuable reference for soil survey organizations and agencies or individuals requesting a soil survey. It describes how to plan soil survey projects and how to negotiate contracts for their completion. Special emphasis is given to organizational and personnel problems associated with making soil surveys under unfamiliar conditions in foreign countries.

Western offers suggestions to contractors on how to interpret the requestor's needs in order to develop specifications for the survey, and how to determine how much to charge the requestor for the type of soil survey required. The author also provides information on the problems of quality control in soil surveys.

Each of the eight chapters discusses a segment in the planning and execution of a contract soil survey, from the contracting through the reporting stages.

Western draws upon his extensive experience as a soil survey contractor in several countries for his discussion of topics such as negotiations, liaison, and contract documents. The appendix contains "how-to" sections on proposal preparation and contract agreements.

—Richard L. Guthrie, soil scientist, SCS, Lanham, Md.

Learning Through Scouting

by Walley Turner

Enjoying camping, swimming, canoeing, and archery with youths their own age is popular with Boy Scouts. But along with the fun, Boy Scouts of America programs are designed to teach about the environment and about the wise use and conservation of our natural resources. Reaching this goal is part of the merit badge program.

Since Scouts are required to master a subject well to earn a merit badge, the Palmetto Boy Scout Council of South Carolina sponsors a special, week-long summer camp to help Boy Scouts work on merit badges dealing with natural resources. The workshop is held just over the State line in North Carolina at Camp Palmetto near the town of Saluda, N.C., and has been held there every summer since 1975.

Instruction at the camp includes soil and water conservation, fish and wildlife management, forestry, geology, weather, and nature study. In addition to the Palmetto Council's staff, resource professionals from the Soil Conservation Service, the Forest Service, and the South Carolina Department of Wildlife and Marine Resources help Scouts gather information and acquire the skills necessary to earn merit badges in natural resources.

SCS in South Carolina assigns one of its most recently hired soil conservationists to work with the Scouts at Camp Palmetto. The new employees are usually young and can relate well to the Scouts. It also gives the new employee experience in working with youth organizations.

For example, last year SCS Soil Conservationist Dennis Woodson from Greenville, S.C., taught soil and water conservation at the camp. He set up demonstrations to show the effects precipitation, erosion, percolation, transpiration, and the capillary action of water have on soil. The Scouts were also required to be familiar with the contents of a soil survey. Field studies include comparing soil survey descriptions of soil in the camp with actual auger borings taken of soil in the area.

Part of the instruction about soil at the camp includes practice in determining the pH of different kinds of soil, and to learn why applying lime and fertilizer is sometimes necessary. The Scouts also learned how to manage small bodies of water for fish production and how to test pond water quaiity for its ability to support plant and animal life.

Scouts also worked on a field project that combined learning and action. The boys helped build a check dam to slow water that was washing fill material off a nearby stream culvert. Through the hands-on experience the Scouts learned how to plan and complete a conservation project and to help solve an erosion problem at the camp.

The Scouts went to the Pisgah National Forest to study forestry and fish and wildlife management, and to learn how to identify different kinds of trees. The Department of Wildlife and Marine Resources arranged studies of wildlife common to the area and how to improve and protect wildlife habitat. A day-long tour included stops at a Forest Service ranger station, a U.S. fish hatchery, and the Cradle of Forestry near Brevard, N.C.

"Helping Scouts at Camp Palmetto learn about conserving our natural resources is conservation education in action," said Woodson. "The camp and its surroundings lend themselves well to teaching conservation in the outdoors.

"The greatest reward for me in working with the Scouts is helping young men and boys learn about the world they live in and what they can do to maintain and improve the environment."

Instruction about soils at Camp Palmetto includes practice in finding the pH of different soils in the area. The Scouts are challenged to find relationships between various soil characteristics and some common land treatment practices such as liming and fertilizing.

Mr. Turner is district conservationist, SCS, Greenville, S.C.

New Publications

Proceedings of the 1979 Irrigation Technical Conference

by The Irrigation Association

The Irrigation Association has published the proceedings of the 1979 Irrigation Technical Conference which took place February 18–21, 1979, in San Francisco, Calif.

The 191-page, illustrated volume contains presentations focusing on the conference theme, "Water, Water Everywhere—But Can We Use It?" Included in the proceedings is the discussion of the President's water policy, water conservation in the United States, and the outlook for irrigated agriculture in California. Other sections consist of agricultural irrigation, turf/landscape irrigation, and drip/trickle irrigation. Special emphasis is given to the use of waste effluent in turf and landscape applications, low-pressure irrigation for agriculture, reduction of energy requirements in irrigation, the use of infrared photography in system design, and other timely subjects.

The proceedings are available for $12 per copy.

Cassette recordings of the conference are also available at $80 for a 12-tape set. The drip/trickle album containing three tapes is $27 per set; the turf album of three tapes is also $27; and the agricultural album is $32 for a 4-tape set.

Prepaid orders for both the proceedings and the tapes may be sent to The Irrigation Association at 13975 Connecticut Avenue, Silver Spring, Md. 20906.

Meetings:

December	
2–5	American Society of Farm Managers and Rural Appraisers, Inc., Chicago, Ill.
3–7	American Geophysical Union, San Francisco, Calif.
3–7	Symposium on Surface Mining Hydrology, Sedimentology and Reclamation, Lexington, Ky.
4–7	Western Forestry Conference, Spokane, Wash.
6	Keep America Beautiful, Inc., New York, N.Y.
10–14	American Society of Agricultural Engineers, New Orleans, La.
28–30	American Agricultural Economics Association, Atlanta, Ga.
January	
3–8	American Association for the Advancement of Science, San Francisco, Calif.
6–10	American Farm Bureau Federation, Phoenix, Ariz.
7–11	North American Game Breeders and Shooting Preserve Association, Orlando, Fla.
13–14	Land and Water Conservation Exposition, Des Moines, Iowa
17–21	National Wool Growers Association, San Diego, Calif.
21–25	National Cattlemen's Association, San Diego, Calif.
February	
10–14	National Association of Conservation Districts Convention, Houston, Tex.
11–15	Society for Range Management, San Diego, Calif.
15–18	American Association of School Administrators, Anaheim, Calif.
20–23	Land Improvement Contractors of America, Phoenix, Ariz.
23–27	The Irrigation Association Technical Conference, Houston, Tex.

Soil Surveys Published

Connecticut: New Haven County.
Florida: Osceola County.
Georgia: Brooks and Thomas Counties.
Illinois: Kane County and Kankakee County.
Indiana: Miami County.
Iowa: Lee County.
Kansas: Kingman County and Sedgwick County.
Massachusetts: Nantucket County.
Michigan: Clare County.
Missouri: Knox, Monroe, and Shelby Counties.
Nebraska: Boyd County.
New Jersey: Warren County.
New York: Schuyler County and Ulster County.
Ohio: Mercer County.
Oklahoma: Atoka County, Carter County, Nowata County, and Washita County.
North Dakota: McLean County.
South Carolina: Anderson County.
South Dakota: Tripp County and Yankton County.
Texas: Blanco and Burnet Counties, Cooke County, Lamar and Delta Counties, and Walker County.
Wisconsin: Jefferson County.

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